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ABSTRACT

Changes in teacher behavior in response to different types of feedback were examined. Subjects were faculty members from a two-year college. Five types of feedback were selected: (1) videotapes made during one class period; (2) the Bellack system, which provides the teacher with an observer-made graph of frequencies of teacher and student interaction; (3) every question asked by the teacher during a given period written down verbatim; (4) written reactions by students on specific teaching activities during instruction; and (5) questionnaires gathering student perceptions of the class, teacher, and their own progress. Teachers' perceptions of a feedback's novelty, credibility, and relevance were also sought. Comparisons among the five types of feedback showed that the types most related to student learning increased teacher change to a greater extent than did types less related to student learning. Teachers did not perceive the five types of feedback differently on the dimensions of novelty, credibility, and relevance. Student questionnaires were seen most likely to produce change, followed by students' written reactions on class activities. Videotaping proved to be less associated with teacher change than did other types of feedback. (JD)

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Type and Perception of Feedback and Teacher Change

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Abstract

This study investigated the effect of five different types of feedback (videotaping, Bellack feedback, student questionnaires, selective verbatim, and student covert reactions) on teacher change. Further, it studied the effect of a teacher's perception of a feedback's novelty, credibility, and relevance on teacher change. Finally, it looked at the relationship between the feedback's relevance to student learning, and teacher change. Log-linear regression showed that the type of feedback given to a teacher affects the likelihood of change. Comparisons among the five types showed that feedback most related to student learning increased change to a greater extent than did feedback less related. Teachers did not perceiv the five types of feedback differently on the dimensions of novelty, credibility, and relevance. However, if a particular type of feedback was seen as high in novelty, credibility, and relevance, it was twice as likely to affect change as when it was seen as average on these dimensions.

Type and Perception of Feedback

and Teacher Change

The widespread use of feedback to help teachers improve instruction is generally supported by research. For example, student ratings as a form of feedback have been shown to produce changes in teachers (Aleamoni, 1980; Aubrecht, 1979; Bryan, 1963; Centra, 1973; Cohen, 1980; Gage, Runkel, & Chatterjee, 1963; Hoyt & Howard, 1978; McKeachie et al, 1980; Overall & Marsh, 1978; Tuckman & Oliver, 1968). Similarly, using videotape to view one's performance produces changes in both the teacher's perception and in subsequent teaching (Fuller & Manning, 1973; Guttman & Haase, 1972; Peterson, 1973; Salomon & McDonald, 1970; Starr, 1977; 1979).

The primary aim of these and similar studies has been to demonstrate that feedback per se is effective in helping teachers improve their teaching. The present study addresses two questions about the nature of the feedback: 1) Are some types of feedback more effective than others in producing change, and 2) What is there about a given type of feedback that makes it more or less effective?

In preliminary pilot studies conducted by the authors, the importance of the teacher's perception of the feedback was

observed. Current theory and research in perception and attention acknowledge purposiveness and intentionality in perception. Such purposiveness suggests the existence of an internal mechanism which governs the selection of incoming information and how it is processed. This selection mechanism becomes the set of criteria by which incoming information is judged. Also, it acts a filter to screen out some information and to allow other information to be processed (Clement, 1978; Eysenck, 1982; Fergus & Melamed, 1976; Hochberg, 1978; Hogarth, 1980; Kahnemen, 1973; Klein, 1970). For example, one criterion used might be "stimulus intensity". If the stimulus is perceived to have high intensity it is attended to more readily than if it has low intensity. Thus, if a color is perceived to be brighter, or a noise louder, it is more readily attended to than one with low perceived intensity.

Again, in preliminary pilot studies, the authors have noted that many teachers attend to feedback they perceive as novel, credible, or relevant. These are some perceived dimensions by which feedback is judged to be important. The present study investigates these three dimensions of feedback in an attempt to determine whether a teacher will attend to the feedback, consider it to be important, and change as a result. If it can be determined how a teacher perceives a given type of feedback, then one might predict the effectiveness of that feedback in prompting change.

In addition to a feedback's novelty, credibility, and relevance, the authors have noted tha· teachers give special attention to feedback which relates to the progress of their students. Feedback which gives a teacher information about student learning tends to receive carefule scrutiny. In contrast, feedback unrelated to student learning receives less attention. For example, feedback about the teacher's tone of voice tends to be noted by the teacher but it does not seem to generate as much careful attention as feedback about student misunderstanding of a concept.

Research Questions

1. When given five different types of feedback, will some be associated with greater change in teaching than others?
2. Will feedback which is perceived as more novel, credible, or relevant be associated with greater change than feedback perceived to be less along these dimensions?
3. Is feedback which is more related to student learning associated with greater change than feedback less related to student learning?

Description of variables

Perceived dimensions

The first dimension along which feedback will be perceived is novelty. Novelty is its newness to the teacher. In almost

all cases, some part of the feedback will be familiar and predictable by the teacher before even being seen. At the same time, other parts of the feedback will appear new to the teacher. For example, a viewed videotape reveals not only noisy students (already known information), but also that cheating is taking place among students in the back of the room during the passing in of assignments (new information).

The second dimension along which feedback will be perceived is credibility. Credibility is the believability of the feedback. How valid or truthful for the teacher is the information being received? For example, seeing the cheating on videotape may be more credible to the teacher than receiving this same information from an outside observer visiting the class.

The third dimension along which feedback will be perceived is relevance. Relevance is the importance of the feedback to the teacher's personal teaching goals. For example, cheating might concern the teacher greatly if a personal teaching goal is the development of integrity in students. On the other hand, feedback about the teacher's jokes would not be considered relevant to this goal of personal integrity.

Types of Feedback

Five types of feedback were selected for the study. Types were selected which are typically used in teacher development and inservice programs. Each type is identified below along with the method used to gather it:

1. Videotaping

Teachers were videotaped for 20-25 minutes during one class period. After the taping session, the teacher was given a set of guidelines to use as he or she reviewed the tape. These guidelines identified several general aspects of teaching to be focused on during the review. As a teacher reviewed each aspect, he or she identified personal strengths or weaknesses

2. Bellack feedback

The Bellack system was the second type of feedback used (Bellack, 1963). This feedback provided information for teachers about important classroom events. The instructional moves used by this system are described and illustrated in Figure 1.

<Insert Figure 1 about here>

Data were gathered by the experimenter for each teacher from at least two different classes.

The Bellack feedback was then presented to each teacher in the form of a bar graph (see Figure 2) depicting the frequencies of teacher and student moves.

<Insert Figure 2 about here>

This graph provided an overall picture of interactions throughout the entire class period. Teachers received a bar graph for each of the two classes. To facilitate a teacher's interpretation of these graphs, the experimenter met with each teacher and provided the following information: 1) Descriptions and illustrations of the four instructional moves, 2) written guidelines for

interpreting the feedback, and 3) the experimenter's own interpretation of the data.

3. Student covert reactions

This type of feedback consisted of student covert reactions to specific teaching activities during instruction. Each student was given a form containing several repetitions of the following statement:

When you _____, I _____

During the instruction students identified their feelings or thoughts whenever triggered by something the teacher did or said. For example, if the teacher started reading from the text and the student began to feel bored, the student might have written: "When you read from the text, I start to get bored". Later in the lesson the student might respond: "When you let students participate in the lesson, I feel important and learn more easily".

Feedback was gathered by the experimenter for each teacher in at least two classes. Teachers were given a composite list of all the teacher activities and student responses. Additionally, each teacher was given instructions on how to analyze the feedback. For example, teachers were directed to identify recurring covert student reactions during instruction. What were the positive reactions? What were the negative reactions? What were you doing that might have triggered each type of reaction?

4. Selective verbatim of classroom questions.

This feedback consisted of writing down verbatim every question a teacher asked during a given class period. Data were gathered by the experimenter for each teacher from one or two class periods.

The questions were then given to each teacher along with the following guide to assist them in their analysis of the feedback:

1. What was your intention in asking the question?
2. What kind of response did your question elicit?
3. How might the student react to being asked this question?
4. How successful was the question in meeting your intentions?

5. Student questionnaires

This type of feedback consisted of a set of open-ended written questions which were administered during the regular class period. Students were asked to describe in writing their perceptions of the class, the teacher, and their own progress. The seven following questions were used on the questionnaires:

1. Describe your progress in this class.
2. How have you changed because of this class?
3. Describe what you do outside of class to prepare for this class.

4. Describe what typically goes on in your mind during class. How much of the time are you concentrating on the lesson?
5. Describe your instructor's teaching style.
6. What would greater facilitate your learning in this class?
7. Describe the atmosphere of the class.

Because of time constraints, only subsets of from two to four of these seven questions were asked in any one class. However, students in each of a teacher's classes responded to at least four of the above questions. While no one student responded to more than four questions, each teacher finally received responses to all seven. Student responses were coded and categorized by the experimenter and then reported to the teacher in summary form.

Procedure

Sample

Subjects for the study were faculty members from a two-year private college. The academic vice-president invited all interested faculty to participate in a faculty development program. From the thirty who volunteered, nineteen were selected whose schedule fit the experimenter's on-site visit schedule. Thus, there was unintentional random selection from the volunteering teachers. The sample represented a variety of

departments: Music, drama, geology, physics, English, nutrition, French, Spanish, interior decorating, business, horticulture, education, biology, and health. The participating faculty ranged in years of college teaching experience from one to 25, the average being 10. All of the teachers were teaching at least four classes per week.

Data Collection

The data were collected over a three-week period starting two weeks after the beginning of the winter semester. A standard sequence was carried out with each teacher: 1) An orientation, 2) classroom visitations in which the Bellack data, student covert reactons, and selective verbatim of questions were gathered, 3) videotaping, 4) videotape review, 5) student questionnaires, and 6) feedback presentation.

Immediately upon completion of this sequence, each teacher was asked to rate each of the five types of feedback in terms of its novelty, credibility, and relevance. Each feedback's novelty, credibility, and relevance was rated on a five-point Likert scale, ranging from "exhibits very little" to "exhibits very much". After this exercise, teachers were asked to rate how much each type of feedback informed them about student learning. This rating item ranged from "very little" to "very much". Fifteen of the nineteen teachers completed the ratings.

After a two-month interval, follow-up interviews were conducted with seventeen of the nineteen teachers. Teachers were

asked to identify: 1) Changes they had already implemented in their teaching as a result of the feedback and 2) changes they were planning to implement in the future. Additionally, they were asked to identify which type of feedback prompted each change, made or planned.

Data analysis

The teacher ratings were organized into a multidimensional contingency table. They were classified by type of feedback, perceived dimension, rating of each type of perception, and whether the teacher making the rating indicated that change was 1) planned, or 2) had already occurred (see Table 1).

<Insert Table 1 about about here>

A teacher rated a perception on a single five-point Likert scale: "exhibits very little" (1), "little" (2), "average" (3), "much" (4), "exhibits very much" (5). For analysis, the scale itself was collapsed into two categories: Ratings of 1, 2, and 3 were categorized as "average" and ratings of 4 and 5 were categorized as "high". Thus, the feedback was classified as either "high" or "average" in its perceived novelty, credibility, and relevance. There were several reasons for collapsing this category for the analysis. First, the five point scale yielded a large number of 0 or small cells. Second, because each type of feedback was rated using only one scale item, collapsing yielded more reliable discriminations between "average" and "high" ratings. Third, the study focused only on what happens when

there is greater perceived novelty credibility, and relevance of the feedback, making the lower categories less relevant to the study.

Given the multidimensional nature of these categorical data, log-linear modelling techniques were used. This procedure identified the simplest logistic model that adquately predicted the observed frequencies in Table 1 (Bishop, Fienberg, & Holland, 1975; Knoke & Burke, 1980). The general logistic model used for the analysis included "teacher change" as the response variable and the remaining variables as predictor variables. The procedure for analyzing logistic models is similar to that commonly used with regression techniques. It shows whether the predictor variables have an effect upon the response variable. The simplest logistic model can be used to estimate the probabilities of teacher change associated with predictor variables in the model.

Results

The first model analyzed was the saturated model, consisting of the 1) response variable, 2) predictor variables, and 3) all possible interactions. The results of this analysis are reported in Table 2.

<Insert Table 2 about here>

The saturated model, as a whole, failed to reach an adequate level of significance ($p > .25$). However, since this was an exploratory study, the decision was made to carry the analysis

further.

The variables and their interactions whose F-ratios closely approximated significance ($p <= .25$) were retained in a simpler model. The .25 level has been suggested as an appropriate level for testing relationships among variables in exploratory models because it increases the chances of detecting important variables no matter how slight their impact (Knoke & Burke, 1980; Forthofer & Lehnen, 1981).

This analysis identified two relationships that were significant: 1) the interaction of change and type of feedback, and 2) interaction of change and rating of perception. Interpreted, this means the following: In the first relationship, the different types of feedback had an effect on the probability of teacher change. In the second relationship, a teacher's rating, either high or average, had an effect on the probability of change.[1]

The next step was to use the reduced model to estimate the probabilities of teacher change, given the predictor variables in the model. Table 4 reports these probabilities.

<Insert Table 4 about here>

The highest probabilities of change were associated with student questionnaires (p=.60), followed by the student covert reactions (p=.54), Bellack feedback (p=.44), videotaping (p=.33), and selective verbatim on questions (p=.22). Table 4 also shows that a high rating on the feedback is associated with a higher

probability of teacher change than is an average rating. feedback. This held for all types of feedback.

The types of feedback were further analyzed using a set of comparisons to detect specific differences between them. The comparisons were based on the teachers' ratings of the degree to which each type of feedback informed them about their students' learning. The most informative type of feedback was student covert reactions, followed by student questionnaires, Bellack feedback, videotaping, and selective verbatim on questions.

The first comparison was between feedback most informative about student learning (student covert reactions and student questionnaires) and least informative (Bellack feedback, videotaping, and selective verbatim on questions).

<Insert Table 5 about here>

Results reported in Table 5 show that the two types of feedback most informative about student learning (student covert reactions and student questionnaires) are associated with a significantly higher probability of teacher change than are those which are least informative (Bellack feedback, videotaping, and selective verbatim on questions).

The other three comparisons, also reported in Table 5, showed no differences among each other within each of the two groups. That is, student covert reactions produced no more change than did student questionnaires. Likewise, Bellack feedback, videotaping, and selective verbatim showed no

differences in prompting change.

Discussion & Conclusion

The first question asked in this study was whether different types of feedback are associated with higher probabilities of teacher change. The results show that the type of feedback is, indeed, related to whether or not a teacher will change. But, not all types of feedback are equally effective. Student questionnaires by students are most likely to produce change, followed by student covert reactions, Bellack, videotaping, and selective verbatim of questions. It should be noted that videotaping proved to be less associated with teacher change than other types of feedback, contrary to widespread opinion.

The second question was whether the effectiveness of a given type of feedback in producing change was due to its perceived novelty, credibility, or relevance. Results showed that no one type of feedback was more novel, credible or relevant than another. Therefore, we cannot account for the difference in a feedback's effectiveness in terms of teacher perception, because there were no differences in these perceptions. However, when a particular type of feedback is perceived as high on all three, a teacher is twice as likely to change as when the feedback is perceived as low on all three.

The third question was whether types of feedback concerned with student learning were more associated with teacher change than those that were not. Results showed that as feedback

becomes increasingly related to student learning, it is more likely to produce change in the teacher.

The results of this study suggest that if two teachers receive the same feedback, say, videotaping, and one sees it as novel, credible, and relevant while the other does not, the former will be much more likely to change than the latter. However, some types of feedback tend to produce more changes than others, irrespective of their perceived novelty, credibility, and relevance. The implication, then, growing out of this study is that if a teacher is to receive feedback it should be novel, credible, relevant, and related to student learning.

Footnote

1. An additional analysis was conducted to corroborate these findings. Such an analysis is needed because there are a large number of cells in the table that are either zero (15%) or less than two (13%). It is possible that these small cell counts could have an effect on the outcome of the analysis. This additional analysis involved adding .5 to each cell (Goodman, 1970). The results are reported in Table 3. The results are consistent with those found in table 2. Therefore, there is no need to use adjusted data for further analysis because both sets of data yield consistent results.

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Table 1. Teachers classified by type of feedback received, perceived dimension, teacher rating, and whether change occurred because of the feedback.

Type of Feedback	Perceived Dimension	Rating	Teacher Change: Change	Teacher Change: No Change
Bellack	Novelty	High	5	3
		Average	2	5
	Credibility	High	7	3
		Average	0	5
	Relevance	High	5	5
		Average	2	3
Selective Verbatim	Novelty	High	4	7
		Average	0	4
	Credibility	High	4	10
		Average	0	1
	Relevance	High	3	6
		Average	1	5
Covert Reactions	Novelty	High	9	4
		Average	0	1
	Credibility	High	8	5
		Average	1	0
	Relevance	High	8	5
		Average	1	0
Videotape	Novelty	High	4	6
		Average	2	2
	Credibility	High	6	8
		Average	0	0
	Relevance	High	4	8
		Average	1	0
Student Questions	Novelty	High	5	1
		Average	2	3
	Credibilty	High	5	2
		Average	2	2
	Relevance	High	6	2
		Average	1	2

Table 2. Adjusted analysis of variance for the saturated logit model, Y = CFPR + E.

Source	df	Sum of Squares	F-ratio	p
Change (C)	1	.0277	.0277	.868
Change X Feedback (F)	4	9.0030	2.2508	.061
Change X Perception (P)	2	.4820	.2410	.786
Change X Rating (R)	1	1.2379	1.2379	.266
C X F X P	8	1.5543	.1943	.992
C X F X R	4	4.8948	1.2240	.299
C X P X R	2	1.6896	.8476	.430
C X F X P X R	8	2.9268	.4181	.892

Table 3. Adjusted analysis of variance for the saturated logit model, Y = CFPR + E. This analysis uses original data with .5 added to each cell count.

Source	df	Sum of Squares	F-ratio	p
Change (C)	1	.5126	.5126	.474
Change X Feedback (F)	4	8.7572	2.1893	.068
Change X Perception (P)	2	.4649	.2324	.793
Change X Rating (R)	1	2.6369	2.6369	.105
C X F X P	8	1.5565	.1946	.992
C X F X R	4	4.7386	1.1847	.316
C X P X R	2	1.8420	.9210	.398
C X F X P X R	8	3.3689	.4211	.909

Table 4. Expected probabilities from the reduced logit model, Y = CF + CR + E.

Type of Feedback	Rating	Teacher Change: Change	Teacher Change: No Change
Bellack	High	.56	.46
	Average	.31	.69
Selective Verbatim	High	.31	.69
	Average	.13	.87
Covert Reactions	High	.66	.34
	Average	.41	.59
Videotape	High	.44	.56
	Average	.22	.78
Student Questions	High	.72	.28
	Average	.48	.52

Table 5. Comparisons among the different types of feedback based on their degree of informativeness about student learning.

Comparison	F-ratio
Covert reactions and student questionnaires versus all other types	4.77 *
Covert reactions versus student questionnaires	0.17
Bellack versus selective verbatim and videotape	1.60
Selective verbatim versus videotape	0.94

* $p < .05$

Figure 1. Definitions and illustrations of the four instructional moves coded in the Bellack system.

STRUCTURING: Initiating a new direction in the lesson; setting the context for the next series of classroom events; introducing new material; moving the class forward.

Examples—
Teacher structuring: "Now, let's talk about the concept of momentum." or "Having developed the rationale, we are ready to learn about multiple regression."

Student structuring: "Before we go any further, I need to have something else clarified." or "I think we ought to addresss the issue of terrorism."

SOLICITING: Directly eliciting a verbal, physical, or mental response.

Examples—
Teacher soliciting: "What are the causes of the Civil War?" or "How many read the assignment last night?" or "Class, repeat after me."

Student soliciting: "What is the square root of 2?" or "When is the paper due?"

RESPONDING: Directly answering to a soliciting activity through a verbal or physical response.

REACTING: Any evaluating, elaborating, clarifying, reflecting, or expanding done on groundwork laid by a previous event; it is not directly elicited.

Examples—
Teacher reacting: "That's correct, but under certain conditions that will not be true."

Student reacting: "I think your argument would be stronger by adding another premise."

Figure 2. A sample of the bar graph used to report a Bellack data profile to teachers.